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The Citrus Industry

APR - 2 1951

Code Changes Recommended; Boost Advertising Tax

At a meeting held in Lakeland on March 20, the Florida Citrus Commission voted to recommend seven changes in the Florida Citrus Code and boosted the per box advertising tax on oranges one cent. The boost in the advertising tax was made on recommendation of the commission chairman, W. F. Robinson, who stated that it was necessary to meet the competition of soft drink advertising against orange concentrates and other orange juice drinks.

The recommended changes in the Citrus Code was the result of numerous complaints from certain sections of the industry as regards grapefruit and tangerine provisions of the present code. Recommendations for grapefruit would ease the requirements as to solids and sugar-acid ratio. If the recommendations are accepted by the legislature it would do much toward ironing out opposition to the Code on the part of certain sections of the industry where it has been felt that present requirements are too arbitrary and that they have operated against the producers of grapefruit in some areas.

Tangerines under the recommendations adopted would be treated as a separate and distinct variety, instead of being classified as at present along with oranges or Temples.

Chairman Robinson made a strong appeal to all elements of the industry to work in harmony to secure the passage of the suggested changes by the legislature soon to convene in Tallahassee. As to the Commission itself, all of the recommendations were adopted by unanimous vote and there was little show of opposition on the part of industry members sitting in as listeners at the meeting of the Commission.

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Vol. 32, No. 4 April, 1951

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Citrus Insect Control For April 1951

J. T. GRIFFITHS, JR., R. L. PRATT AND W. L. THOMPSON*
CITRUS EXPERIMENT STATION, LAKE ALFRED, FLORIDA

Many growers had started their post-bloom sprays by March 20. Since most trees were in full bloom by that time, it is to be expected that post-bloom spraying operations will be completed by sometime late in April. In general, there has been a uniform and heavy bloom throughout the state. For several reasons, less parathion will be applied during the post-bloom period this year than in 1950. There are less scale insects present than a year ago, and secondly, some parathion results were not particularly satisfactory during the post-bloom period in 1950. The unsatisfactory results were due primarily to three major causes; one was that too many individuals attempted to spray parathion as they would sulfur. They did not apply enough material nor did they do a thorough enough job so that maximum results could be obtained. Secondly, even when scale infestations were heavy, many growers used only one pound per 100 gallons when it was specifically recommended that at least 1 2/3 pounds per 100 gallons should be used under these circumstances. In the third place, scales increased very rapidly during the spring of last year.

Typical of this were experiments performed at post-bloom time. In spite of the use of either oil or parathion, there was little if any reduction in the scale populations on the sprayed trees. This was accounted for by the fact that scale populations were increasing very rapdily. Scale counts on unsprayed controls showed increases of 200 to 300 percent. These spray results were similar to those obtained in commercial groves.

There have been few major changes in the status of insects during the past month. Both purple and red scale are starting to lay eggs and crawlers will soon be hatching in considerable abundance. Purple scales have shown an increase during the past week and it is to be expected that red scales will soon start increasing. Following the rather severe winter temperatures, scale populations are generally very low. As always, there are some exceptions, but scale insects are not a problem in most groves. Table I shows data from some plots at the Citrus Experiment Station. In this table the percentage of leaves infested in 1951 is compared with the percentage of leaves infested in 1950. This is a timing experiment and the dates of scalicide applications are shown. It will be noted that without exception the infestations today are materially lower than a year ago. This is apparently typical of the situation over most of the citrus area. Groves are in good condition for starting the summer months so far as scale infestations are concerned. It is to be anticipated, on this basis, that scale infestations will probably be less severe than they were in 1950. A warm fall can materially alter this supposition, but for the moment at least, optimism certainly can be in order.

TABLE I
Comparison of Purple Scale Infestations in March of 1950 and 1951

Months scalicides were applied	% infested leaves March 1950	March 1951
January	20	2
February	22	1
March	48	17
April	49	12
July	28	4
August	14	4
September	17	2
October	11	1
November	17	1
December	33	2
No treatment(1)	38	13
No treatment(2)	24	8
AVERAGES	28.6	5.6

(1)Received all treatments except a scalicide. Treatments include zinc, copper and sulfur sprays.
(2)No sprays or dusts of any kind.

Purple mites are increasing in most groves and were numerous in about one-fourth of groves recently surveyed. These mites will undoubtedly continue to be a problem in many groves during the next few months. In general, rust mites have been on the increase. This is typical for this time of the year and it is to be expected that heavy rust mite infestations will be found soon if control measures are not undertaken. For the first time in several years numerous infestations of six-spotted mites have been recorded. In some instances leaves are dropping and control measures are essential. These infestations are usually worse on grapefruit than oranges. It is probable that the six-spotted mite infestations have appeared as the result of the generally cool weather experienced during the past winter months.

Spray Prgrams

Melanose. Control of melanose is normally accomplished by spraying copper any time within three weeks after petal fall. Copper should be used at the rate of 3 pounds of copper sulfate and lime per 100 gallons or the metallic equivalent in copper if a neutral material is used. This spray should contain 10 pounds of wettable sulfur to the 100. At the end of this discussion will be found Formula 2 from the 1951 Better Fruit Program which shows mixtures compatible with copper and wettable sulfur at this time of year.

In some instances it may be desired that copper be mixed with oil for the combined control of melanose and scale. This is shown as Formula 3 at the end of the discussion and will be further discussed under scale insect control.

Purple Mites. Purple mites will be a problem in a number of groves during the months of April and May unless additional control measures are taken. Four materials are available: DN Dry Mix, DN111, Neotran, and oil. Neotran is more expensive, but is the safest of the three wettable materials. The two DN's are comparable in price, but DN111 should be preferred since it is somewhat safer than Dry Mix.. In any case DN should not be used when temperatures are over 88° or when it is anticipated that they will be above this point. Foliage should have matured before the DN is applied. Oil may be mixed with copper as noted above or used as a straight oil emulsion spray. See Formula 2 and 3 for compatible mixtures.

Six-Spotted Mites. Six-spotted mites may be controlled with the same materials as used for purple mites or by the use of lime-sulfur at 1 to 1½ gallons of liquid lime-sulfur per 100 gallons of spray material. Lime-sulfur may be used in combination with copper, wettable sulfur and arsenic. It should be emphasized that in order to control six-spotted mites, thorough coverage of the underside of the leaves must be obtained. This spring the writers have had occasion to see one infestation after the application of a DN dust. Very little dust settled on the topside of the foliage and there was none on the underside. No control was obtained. This type of job is a complete waste of money so far as six-spotted mite control is concerned. It is absolutely essential that the bottoms of the leaves be covered and spraying is the most satisfactory way to accomplish this.

Rust Mites.—As noted above, rust mites have begun to increase. They should be controlled at post-bloom time even if copper is not to be applied; otherwise, early rust mite injury will occur on fruit, which will cause it to be unsightly and may reduce its market value. Generally good coverage should be obtained if prolonged rust mite control is desired. Sulfur dusts may be used, but sprays will give longer periods of control.

Scale Insects.—Either oil or parathion may be used for scale control

(Continued on page 4)

* Written March 23, 1951. Reports of surveys made by Harold Holtsberg, Cocoa; J. K. Enzor, Jr., Tavares; K. G. Townsend, Tampa; J. B. Weeks, Avon Park; and J. W. Davis, Lake Alfred.

CITRUS INSECTS FOR APRIL 1951 . . .

(Continued from page 3)

during the post-bloom period. Oil may be applied as a straight oil emulsion or it may be combined with a copper. If copper-oils are to be used the application should follow petal fall as soon as possible, preferably within a week, and in no instance should they be applied after the fruit has reached 1-2 inch in size, or more than 3 weeks after petal fall. If this recommendation is not rigidly adhered to, the fruit may be rendered extremely unsightly because of copper injury. Similarly if a straight oil emulsion is to be applied, it should not be applied after the fruit has reached ½ inch in size because for several weeks following that time, fruit is particularly subject to a condition known as oil blotch.

Parathion is an excellent material for controlling scale at this time of the year. Where scale infestations are sufficiently heavy to warrant an extra spray, parathion should be used at 1 2/3 to 2 pounds of 15 percent material per 100 gallons of spray. Either hand machines or Speed Sprayers may be used. If the Speed Sprayer is used, use a single head, drive the tractor at no more than one mile per hour, and use a gallonage per tree equivalent to that which would be applied with an oil spray. Where parathion is mixed with copper and wettable sulfur it may be desirable to reduce the amounts of copper and sulfur proportionate to the increased gallonage that is being applied. Thus normally 25 to 30 percent more gallonage will be used if parathion is included and the copper and sulfur can be reduced by that amount. All precautions laid down for the handling of parathion should be rigidly enforced for all personnel.

Mealybugs. This is the time of the year to look for mealybug infestations. If it is found that egg masses are present on the trunks of the trees, control measures should be taken. The preferred method of control is to use parathion at the rate of 1 2/3 pounds to 2 pounds of 15 percent material per 100 gallons of spray. The trunks should be sprayed as well as the foliage and fruit.

Thorough coverage is essential if mealybug control is to be satisfactory. Past experiences have shown that sprays applied at this time of year are more effective than those applied at any other time so far as mealybug control is concerned.

For more specific information consult the Florida Citrus Experiment

(Continued on page 18)

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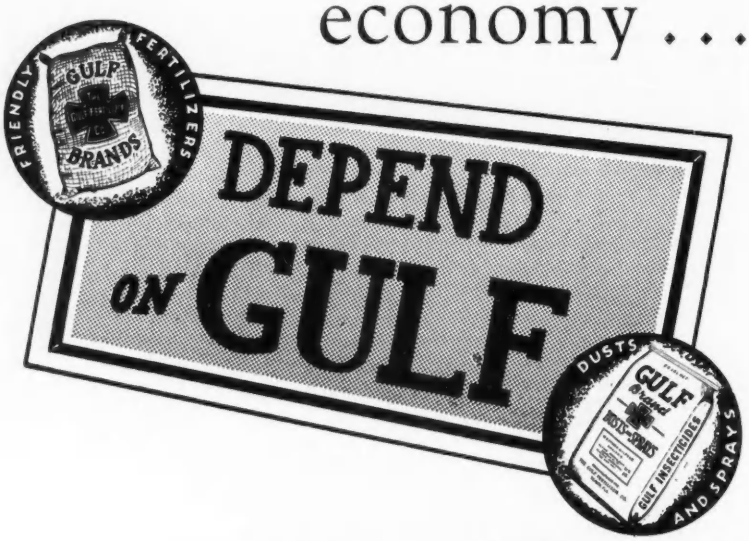

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Issued Monthly
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Publication office at Bartow, Florida. Entered as second class matter February 16, 1920, at the post office at Tampa, Florida, under the act of March 3, 1879. Entered as second class matter June 19, 1933, at the post office at Bartow, Florida, under act of March 3, 1879.

Canned Tangerine Juice

II. Further Studies [1,2]

EDWIN L. MOORE[3], C. D. ATKINS[3], RICHARD L. HUGGART[3], AND L. G. MacDOWELL[4]
FLORIDA CITRUS COMMISSION

A report on exploratory packs of canned tangerine juice by Moore, Atkins, MacDowell, Browne, and Wiederhold (1948), based on work from the 1943-44 season through the 1945-46 season, covers work that was essentially exploratory in nature with the purpose of finding a method of canning tangerine juice which would result in retention of flavor, and also to provide a basis for future experimental work on the canning of tangerine juice. These investigators presented a method in which tangerine juice was simultaneously pasteurized, deaerated, and deoiled by heating the juice to about 240° F. and flashing at this temperature into a chamber under about 9 to 11 inches of vacuum, with resultant removal of air and a large percentage of the peel oil and cooling of the juice to a can filling temperature of 190°-195°F. During the 1945-46 season, this process for the simultaneous pasteurization, deaeration, and deoiling of tangerine juice was explained or demonstrated to representatives of about a third of the citrus processors in Florida, to several equipment manufacturers, and to other persons having interests in the citrus industry.

At the start of the 1946-47 season, a pilot plant (see photo) of approximately ½ gallon-per-minute capacity was built for processing tangerine juice by several methods that might be said to simulate the processes in commercial use at that time for canning citrus juices, and also to continue work on the above mentioned process for simultaneously pasteurizing, deaerating, and deoiling of tangerine juice.

Using this pilot plant, nine experimental runs consisting of 45 juice packs, were made to study the effects of deaeration; deoiling; temperatures of pasteurization; the method for simultaneous pasteurization, deaeration, and deoiling with and without return of the water phase of the centrifuged condensate (condensed vapor); and packaging in plain tin versus citrus enamel cans. These juice packs were divided for 40° and 80°F. storage.

The American Can Company cooperated in this work by furnishing certain necessary equipment and their generous help is hereby acknowledged.

DESCRIPTION OF PILOT PLANT

The diagram of the ½ gallon-per-minute pilot plant used for the processing of tangerine juice beginning at the holding tanks is given in Figure 1. The pilot plant as set up in the laboratory is partially shown in the accompanying photograph (Figure 2). A description of the more essential items making up the pilot plant is given, as follows:

Fruit Press:—The juice was extracted on a Rotary Juice Press* with cup sizes 00, 1, 2, and 4 (2¼, 2-7/8, 3-5/16, and 4¼ inches in diameter, respectively). The capacity of the press was estimated to be about 4 to 5 gallons per minute for each size cup when the press speed was 10 r.p.m.

Juice Screen:—The juice was separated from the seeds and gross pulp by passing through a tapered screw press ("Sep-Ro-Siv") using

1. This investigation was conducted partially at the U. S. Citrus Products Station, Winter Haven, Florida, and partially at the Citrus Experiment Station, Lake Alfred, Florida.
2. Part of this paper has been previously published in an article titled, "Getting Quality-Plus in Tangerine Juice", by Edwin L. Moore, C. D. Atkins, Richard L. Huggart, and L. G. MacDowell, that appeared in Food Industries, Vol. 22, pp. 1186-1188 (July, 1950), and is reprinted with the permission of Food Industries.
3. Research Fellow, Florida Citrus Commission. Present address: Citrus Experiment Station, Lake Alfred, Florida.
4. Research Director, Florida Citrus Commission.

* Particular makes of machines are given only to avoid detailed descriptions, and their mention should not be construed as endorsement by the Florida Citrus Commission.

several size screens.

Balance Tank:—A stainless-steel rectangular tank of 20 gallons capacity was used to maintain a level of juice above the juice pump.

Juice Pump: — The juice was pumped from the balance tank to the holding tanks by a Tri-Clover stainless-steel centrifugal pump. The operation of the pump was controlled to avoid completely emptying the balance tank.

Line Strainer:—A stainless-steel line strainer with 1/8 inch perforations was in the juice line from the balance tank to the holding tank.

Holding Tanks: — The stainless-steel tanks of 60 gallons capacity each, and equipped with agitators were used for division of the juice before processing.

Pasteurizer (below 212°F.):—The juice pump used was a Bump pump, stainless steel, positive displacement. The pump was connected with a Reeves Drive and was adjustable in capacity from ½ to 1½ gallons per minute. The juice was pumped through 78 feet of 3/16 inch I. D. X. 0.035 inch wall stainless steel tubing. The first 38 feet of the tubing was coiled and enclosed in a water jacket made from a tube 4 feet in length and 4 inches in diameter and closed on either end with flanges. The remaining 40 feet of tubing was coiled and insulated. A Taylor Indicating Controller regulated water temperature by addition of steam. The bulb of a Taylor Fulscope Recorder was placed in a thermometer well at the end of the heating coil to record temperature. The rate of pasteurization was determined to be 2/3 gallon per minute when the speed of flow was 7.8 feet per second. The juice was heated in 4.8 seconds and held near the pasteurization temperature for 5.2 seconds. The observed deviation of juice temperature was 0.5°F.

Pasteurizer (above 212°F.):—This unit operated on principles similar to those of Mallory (1942). The juice pump used was a laboratory model Manton Gaulin Homogenizer pump with a capacity of 25 gallons per hour under 400 to 600 pounds per square inch line pressure in operation with this high temperature pasteurizer. The juice was pumped through 80 feet of 1/8 inch I. D. X. 0.035 inch wall stainless steel tubing. The first 40 feet of the tubing was jacketed in 8 foot sections by 3/4 inch pipe with steam inlet and condensate outlet, and the remaining 40 feet of tubing was jacketed with 3/4 inch pipe with water inlet and outlet. A Taylor Indicating Controller indicated the highest juice temperature. The deviation of the control tolerance of the temperature of the hot juice was 0.5°F. The rate of pasteurization was determined to be about ½ gallon per minute when the juice velocity was 11 to 16 feet per second. The cooling temperature was controlled by a Taylor Indicating Controller, and the deviation of the temperature of the cooled juice was 2°F. When it was desired to subject the juice to the flash-boiling process, a flow-diversion valve located between the heating and cooling sections of the pasteurizer diverted the hot juice to the vapor separator.

Deaerator and Deaerator-Deoiler: Vapor Separator, Pump, Heater, Condenser, and Condensate Receiver:—The vapor separator for the deaerator and deaerator-deoiler was a 60-gallon capacity jacketed-vacuum tank. The desired quantity of juice was drawn into the tank by vacuum. A 1½ inch Bump pump, size No. 25, with variable speed capacity of 6 to 26 gallons per minute pumped the juice from the bottom of the chamber and forced it through a heater consisting of a 1 inch O. D. X 18 gauge stainless steel tube enclosed by a jacket 6½ feet in length. The heated juice was discharged tangentially into the vapor separator from a Standard Schutte and Koerting spray nozzle with 7.5 mm. orifice. The vapors were condensed in a condenser 6 feet long and 8-5/8 inches in diameter with 50 stainless steel tubes 3/4 inch O. D. X (mixed 16 and 18 gauge) X 6 feet long having an O. D. surface area of about 59 square feet. Refrigerated water was used to maintain low temperatures and the condensed vapors were caught in an 8 gallon capacity glass graduated chamber to decant oil and measure condensate.

High Temperature Deaerator-Deoiler: Vapor Separator, Condenser, Centrifuge and Pumps:—The vapor separator for the pasteurizer-deaerator-deoiler was 12 inches in diameter with a height of 28 inches including the conical ends. This chamber was constructed of stainless steel and was designed to operate under 5 to 11 inches of vacuum. The juice entered this flash chamber tangentially through a 3/32 inch orifice. The vapors were condensed in a condenser 6 feet long and 6-5/8 inches in diameter with 27 stainless steel tubes 3/4 inch O. D. X 16 gauge X 6 feet long having an O. D. surface area of 32 square feet. Refrigerated water was recirculated to maintain low temperatures in the condenser. The condensate from the juice was withdrawn by a small diaphragm pump (capacity 60 ml. per minute) to a laboratory model Sharples Super Centrifuge running at about 26,000 r.p.m. to separate peel oil, and when desired the water phase of the condensate was returned by another small diaphragm pump to the original juice at a point of entry of the pasteurized juice to the flash chamber. The juice was pumped from the vapor separator to the filling spout by means of an Eastern Engineering centrifugal pump.

Source of Vacuum:—The source of vacuum was a Croll Reynolds 3-stage hydro-steam vacuum pump with two steam jet exhausters operating in series and discharging into a water jet exhauster that discharged to the atmosphere. It had an operation capacity of 10 pounds of air-vapor mixture per hour at 29.45 inches of vacuum.

Filler:—The spout type filler was composed of 3 parts: a 2-way diversion valve that permitted return of the juice to the holding tanks, a Taylor Indicating Controller, and a filler spout of ½ inch O. D. stainless steel tubing.

Can Closing Machine:—The closing machine used was an American Can Company No. 1 Western, semi-automatic closing machine.

Can Cooler:—The can cooler was a Thermo-Roto type with rolls submerged in water. The speed of rotation of the rolls was 60 r.p.m.

FRUIT USED

In all instances, the tangerines were stored at about 40°F. from the time of receipt at the laboratory until processed.

The tangerines used in experimental runs A and B were grove-run fruit obtained from a nearby packing house on December 11, 1946. Because of equipment delays, the packs of juices for experimental run A were not made until January 9, 1947, and for experimental run B not until January 10.

The tangerines used in experimental runs C, D, E, and F were

grove-run fruit (rough lemon rootstock) obtained from "standard fertilizer practice plots" of the Citrus Experiment Station, Lake Alfred, Florida, on January 21, 1947. The packs of juices for experimental run C were made on January 22; for experimental run D on January 24; for experimental run E on January 29; and for experimental run F on January 30.

Tangerines used in experimental runs G, H, and I were also grove-run fruit (rough lemon rootstock) obtained from "standard fertilizer practice plots" of the Citrus Experiment Station, Lake Alfred, Florida, on January 30, 1947. The packs of juices for experimental run G were made on February 10; for experimental run H on February 11; and for experimental run I on February 14.

PREPARATION OF EXPERIMENTAL JUICE PACKS

A total of 9 experimental runs consisting of 45 juice packs, were made to study the effects of deaeration; deoiling; temperature of pasteurization; the method for simultaneous pasteurization, deaeration, and deoiling with and without return of the centrifuged condensate (condensed vapor); and packaging in plain tin versus enamel cans.

The four experimental runs A. B, C, and D, consisting of 18 juice packs were designed to study the effect of pasteurization temperatures on deaerated juices and juices that had been both deaerated and deoiled.

The two experimental runs E and F, consisting of 12 juice packs, were designed to study the effect of deaeration versus non-deaeration when juices were pasteurized at different temperatures. Air was also incorporated into deaerated juices to represent the maximum air that would be incorporated by pumps, etc., in canning operations, and these juices were similarly processed.

The two experimental runs G and H, consisting of 10 juice packs, were designed to study the effect of deaerating and deoiling a juice before pasteurization versus pasteurizing a juice and flashing it under vacuum to deaerate and deoil the juice and cool it to filling temperature.

The one experimental run I, consisting of 5 juice packs, was designed to study the effect of discarding or returning the water phase of the centrifuged condensate when the juice was pasteurized and then flashed under vacuum to deaerate and deoil the juice and cool it to filling temperature.

An outline of the methods of preparing the 45 juice packs together with their recoverable peel oil contents is given in Table 1.

For all packs, the juices were extracted using the Rotary Juice Press. A batch of from 31 to 48 gallons of juice was extracted for each experimental run, depending upon the number of packs to be

Table 1.

Methods of Preparation and Recoverable Peel Oil Contents of the Tangerine Juice Packs.

Experimental Run No.	Pack No.	Size of Screen	Treatment	Actual temperature of pasteurization	Temperature of filling	Canned juice cooled to	Type of can	Recoverable peel oil by volume	
								Raw	Canned
		Inches		°F.	°F.	°F.		percent	percent
A	1	0.030	Deaeration with condensate returned	205	195	77	Plain	—	0.043*
	2	"	"	205	195	77	Enamel	—	0.043
	3	"	"	240	195	77	Plain	—	0.037
	4	"	"	240	195	77	Enamel	—	0.037
B	1	0.030	Deaeration and deoiling with water phase of condensate returned	205	195	77	Plain	—	0.015
	2	"	"	205	195	77	Enamel	—	0.015
	3	"	"	240	195	77	Plain	—	0.015
	4	"	"	240	195	77	Enamel	—	0.015
C	1	1/16	Deaeration and deoiling with water phase of condensate returned	204	200	80	Plain	0.008	0.003
	2	"	"	204	200	80	Enamel	0.008	0.003
	3	"	"	240	200	85 est.	Plain	0.008	0.004
	4	"	"	240	200	85	Enamel	0.008	0.004
D	1	1/16	Deaeration and deoiling with water phase of condensate returned	207-211	200	82	Plain	0.023	0.007
	2	"	"	207-211	200	82	Enamel	0.023	0.007
	3	"	"	239-241	196-203	85	Plain	0.023	0.008
	4	"	"	239-241	196-203	85	Enamel	0.023	0.008
	5	"	"	206	200	88	Plain	0.023	0.005
	6	"	"	206	200	88	Enamel	0.023	0.005
E	1	1/16	No treatment	205	197	83	Plain	0.039	0.032
	2	"	"	205	197	83	Enamel	0.039	0.032
	3	"	Deaeration with condensate returned	205	198	84	Plain	0.039	0.025
	4	"	"	205	198	84	Enamel	0.039	0.025
	5	"	Deaeration, condensate returned, and then air reincorporated	207	200	84	Plain	0.039	0.029
	6	"	"	207	200	84	Enamel	0.039	0.029
F	1	0.027	No treatment	240	202	88	Plain	0.042	0.032
	2	"	"	240	202	88	Enamel	0.042	0.032
	3	"	Deaeration with condensate returned	240	202	88	Plain	0.042	0.027
	4	"	"	240	202	88	Enamel	0.042	0.027
	5	"	Deaeration, condensate returned and then air reincorporated	240	204	88	Plain	0.042	0.023
	6	"	"	240	204	88	Enamel	0.042	0.023
G	1	0.040	Pasteurized and then flashed under vacuum to deaerate, deoil, and cool to filling temperature, condensate discarded.	240	195	71	Plain	0.025	0.006
	2	"	"	240	195	71	Enamel	0.025	0.006
	3	"	Deaeration and deoiling with water phase of condensate returned	200	195	73	Plain	0.025	0.006
	4	"	"	200	195	71	Enamel	0.025	0.006
H	1	0.040	No treatment	200	195	65	Plain	0.030	0.025
	2	"	"	200	195	65	Enamel	0.030	0.025
	3	"	Deaeration and deoiling with water phase of condensate returned	240	196	71	Plain	0.030	0.012
	4	"	"	240	196	71	Enamel	0.030	0.012
	5	"	Pasteurized and then flashed under vacuum to deaerate, deoil, and cool to filling temperature, condensate discarded.	240-246	198	73	Plain	0.030	0.006
	6	"	"	240-246	198	73	Enamel	0.030	0.006
I	1	0.040	"	242	193-194	—	Plain	0.031	0.005
	2	"	"	242	193-194	—	Enamel	0.031	0.005
	3	"	As above, but water phase of condensate returned	242	192-194	75	Plain	0.031	0.005
	4	"	"	242	192-194	75	Enamel	0.031	0.005
	5	"	No treatment	205	195	—	Enamel	0.031	0.024

* It was assumed that the juice canned in enamel from the same processing variation would have the same recoverable peel oil content.

put up in the run. The juice yield varied from 3.1 to 3.4 gallons per box of fruit.

All juices were screened through the tapered screw press. The size of the screen used varied with the experimental run, because of the breakage of the smaller-size screen and the use of the larger-size screen to try to incorporate more pulp into the juice. After screening, the juice was pumped to the 60-gallon holding tank which is the starting point for the processing as illustrated in Figure 1. The processing variations follow:

Experimental Run A:—Approximately 40 gallons of juice was drawn from the holding tank into the deaerator where it was recirculated for 2 minutes at 60°F. under vacuum great enough to cause boiling. Approximately 1 percent of the juice was evaporated and recovered as condensate. The deaerated juice with condensate returned was then drawn back into the holding tank and divided equally for further processing at 205°F. in the low-temperature pasteurizer and at 240°F. in the high-temperature pasteurizer.

Experimental Run B:—Approximately 44 gallons of juice was drawn from the holding tank into the deaerator-deoiler where it was recirculated for 12 minutes with the heater maintained at 120° to 130°F. The steam jacket on the deaerator-deoiler was held at 110°F. Approximately 6 percent of the juice was evaporated and recovered as condensate. The deoiled juice was then drawn from the deaerator-deoiler back into the holding tank. The recovered condensate, from which 200 ml. of oil and oil-water emulsion had been decanted and discarded, was then added back to the deoiled juice in the holding tank and mixed. The juice was then divided equally for further processing at 205°F. in the low-temperature pasteurizer and at 240°F. in the high-temperature pasteurizer.

Experimental Run C:—Excessive foam was discarded at the holding tank in order to get a good raw juice sample. For the purpose of deaerating and deoiling the juice for pasteurization at 205°F. in the low-temperature pasteurizer, 20 gallons of juice was drawn from the holding tank into the deaerator-deoiler. The heater was maintained at 145°F. and the temperature of the juice in the vacuum pan was estimated to be 120°F. Heating was continued for 4 minutes. About 2 gallons of condensate was recovered. After decanting and discarding 500 ml. of oil and oil-water emulsion from the condensate, the remaining condensate was returned to the deaerated and deoiled juice.

For the purpose of deaerating and deoiling the juice for pasteurization at 240°F. in the high-temperature pasteurizer, 24 gallons of juice was drawn from the holding tank into the deaerator-deoiler. The heater was maintained at 145°F. and the temperature of the juice in the vacuum pan was estimated to be 120°F. Heating was continued for 5 minutes. The condensate recovered amounted to 2.2 gallons. After decanting and discarding 400 ml. of oil and oil-water emulsion from the condensate, the remaining condensate was returned to the juice. It should be added here that for packs 3 and 4 of this experimental run, the agitator was run in the holding tank for about 1 minute with the top of the propeller exposed. This incorporated some air into the juice that resulted in foam at the filler.

Experimental Run D:—Excessive foam was discarded at the holding tank in order to get a good raw juice sample. Forty-four gallons of juice was divided into two batches for deaerating and deoiling in the deaerator-deoiler. The first batch of juice was deaerated at 45°F. for 5 minutes with the collection of 100 ml. of condensate. The juice was then deoiled with the temperature of the heater maintained at 145°F. and the temperature of the juice in the vacuum pan was estimated to be 120°F. Heating was continued for 4 minutes. The condensate recovered amounted to 2.1 gallons. After decanting and discarding 205 ml. of oil and oil-water emulsion from the condensate, the remaining condensate was returned to the juice.

The second batch of juice was deaerated at 50°F. for 3 minutes with the collection of 100 ml. of condensate. The juice was then deoiled with the temperature of the heater maintained at 145°F. and the temperature of the juice in the vacuum pan was estimated to be 120°F. Heating was continued for 4 minutes. The condensate recovered amounted to 2.1 gallons. After decanting and discarding 505 ml. of oil and oil-water emulsion from the condensate, the remaining condensate was returned to the juice.

The two batches of deoiled juice were combined, and the mixture divided into three portions for further processing at 210° and 240°F. in the high-temperature pasteurizer and at 205°F. in the low-temperature pasteurizer.

Experimental Run E:—One-third of the untreated juice was processed at 205°F. in the low-temperature pasteurizer. This juice was very foamy at the filler. Excessive foam was removed from the other two-thirds of the untreated juice. The juice was drawn into the deaerator and deaerated for 5 minutes with the collection of 250

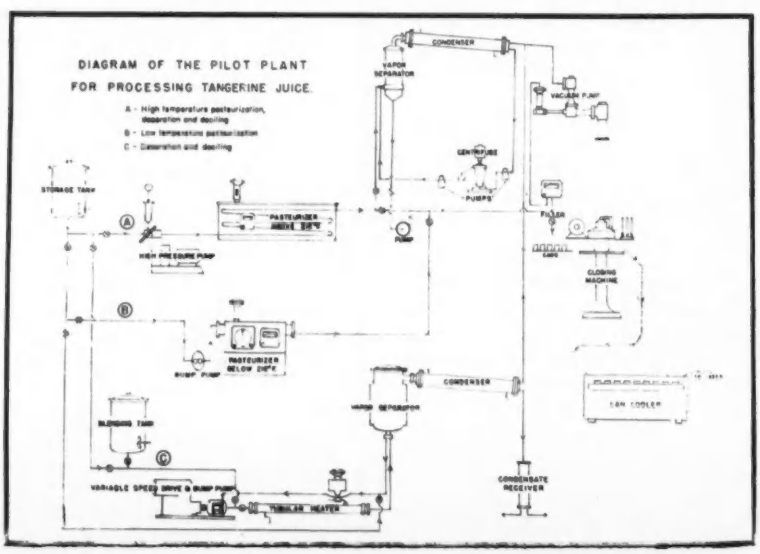

Figure 1. Diagram of the Pilot Plant for Processing Tangerine Juice

ml. of condensate which was returned to the juice. This deaerated juice with condensate added back was then divided into two portions. One portion of the deaerated juice was pasteurized at 205°F. in the low-temperature pasteurizer. The other portion of the deaerated juice was saturated with air by running the agitator while the impeller was cavitating for 3 minutes with air in the holding tank. This air-saturated portion of the juice was then pasteurized at 205°F. in the low-temperature pasteurizer.

Experimental Run F:—This experimental run was similar to experimental run E except that the juices were pasteurized at 240°F. in the high-temperature pasteurizer. Excessive foam was removed from the untreated juice in the holding tank. One-third of the untreated juice was pasteurized and this juice was very foamy at the filler. The other two-thirds of the untreated juice (24 gallons) was drawn into the deaerator and deaerated for 6½ minutes at an estimated vacuum pan temperature of 75°F. with the collection of 430 ml. of condensate. This condensate was cloudy in appearance and showed some separation of oil. This condensate was returned to the deaerated juice and the juice was divided into two portions. One portion of the deaerated juice was pasteurized and the foaminess of this juice at the filler was attributed to the high filling temperature. The other portion of the deaerated juice was saturated with air by running the agitator while the impeller was cavitating with air in the holding tank. This air-saturated portion of the juice was then pasteurized and the juice was foamy at the filler. Part of the foaminess of this juice at the filler was attributed to the high filling temperature. In the canning of this third portion of juice, approximately 2½ gallons of juice from the filler at about 200°F. was poured back into the holding tank because the supply of juice was low.

Experimental Run G:—Excessive foam was removed from the juice in the holding tank. The juice was then divided into two portions. The first portion of the juice was pasteurized at 240°F. in the high-temperature pasteurizer and flashed under 5 inches of vacuum to deaerate and deoil the juice and cool it to a filling temperature of 195°F. If a higher vacuum than this was used, the pump-out pump lost its prime. The condensate recovered amounted to 0.4 gallons and was discarded. This condensate was very clear with fine oil droplets separating out.

The second portion of the juice was deaerated at 40°F. in the deaerator for 3 minutes with the collection of 50 ml. of condensate. This juice was then deoiled in the deaerator-deoiler using a temperature of 135°F. in the heater. The steam jacket was used on the vacuum pan so that the vapors would not condense. The temperature of the juice in the vacuum pan was estimated to be 87°F. The time of deoiling was 14 minutes with the collection of 1 gallon of condensate. This condensate was milky in appearance with a slightly orange cast. After decanting and discarding 150 ml. of oil and oil-water emulsion, the remaining condensate was returned to the juice, mixed, and the juice further processed by pasteurizing at 205°F. in the low-temperature pasteurizer.

Experimental Run H:—Excessive foam was removed from the juice at the balance tank. The otherwise untreated juice in the holding tank was divided into three portions. One portion of the untreated juice was pasteurized at 205°F. in the low-temperature pasteurizer. This juice showed foaminess at the filler and some of the sealed cans floated in the cooler.

The second portion of the untreated juice was drawn into the deaerator-deoiler and deoiled for 2½ minutes. One gallon of condensate was collected that amounted to about 5 percent of the juice volume. After decanting and discarding 330 ml. of oil and oil-water emulsion, the remaining condensate was returned to the juice, mixed, and the juice further processed by pasteurizing at 240°F. in the high-temperature pasteurizer.

The third portion of the untreated juice was pasteurized at 240°F. in the high-temperature pasteurizer and flashed under 5 inches of vacuum to deaerate and deoil the juice and cool it to filling temperature. About 0.4 gallons of condensate was recovered from the 14 gallons of juice. The condensate was discarded. The foaminess of this juice at the filler was attributed to not having enough juice in the vapor separator or not having a high enough vacuum in the vapor separator.

C. I. .... G. SIX .....

Experimental Run I:—The untreated juice in the holding tank was divided into three portions. The first portion of the juice was pasteurized at 240°F. in the high-temperature pasteurizer and flashed under 5 inches of vacuum to deaerate and deoil the juice and cool it to filling temperature. Forty-five ml. of condensate was collected and discarded.

The second portion of the untreated juice was processed similarly to the first portion except that the condensate collected was centrifuged at 24,000 r.p.m. and the water phase returned to the juice. No oil was recovered because the centrifuge broke up the oil and discharged it as a cloud (vaporized).

The third portion of the untreated juice was pasteurized at 205°F. in the low-temperature pasteurizer and filled into enameled cans only.

After pasteurizing, all juices were filled hot into size 211x400 (9½ fluid ounce, 1.25 hot-dip tin plate) plain tin or citrus enamel cans. The rate of filling was 3 to 6 cans per minute. The cans were then inverted for from 32 to 52 seconds before entering the cooling bath. The temperature of the cooling bath varied from 65° to 80°F., and the cans remained in this bath from 6 to 7 minutes. After the cans were removed from the cooling bath, they were packaged in cases of 24. From 2 to 5 cases of juice were canned for each pack, and a part of each pack was placed in storage at 40° and 80°F.

(Concluded Next Issue)

D'ALBORA COMPANY WINS ORANGE PRIZE

Top award for Best in Variety in the mid-season orange class at the Florida Citrus Exposition went to the J. V. D'Albora Company of Cocoa on a box of pineapple oranges.

VALENCIA MINT FLOAT

Residents of New York and other Northern and Eastern states are now enjoying a new and unusual citrus drink, Valencia Mint Float, the newest of citrus products from Florida's citrus groves.

Should I Buy A Citrus Grove?

(Concluded from last issue)

ZACH SAVAGE, ASSO.
AGRICULTURAL ECONOMIST
AGRICULTURAL EXP. STATION

Another grove sold in 1945 on which the Extension Service has records for the four previous seasons, 1940-44. Both returns from fruit and the net returns amounted to more in the 1943-44 season than the sum of these separate items for the three previous seasons. This is a 12-acre Pineapple-Valencia grove averaging 19 years of age at the time it was sold. The net returns averaged $194 for the three seasons of 1940-43. This rate of income, which was during seasons of good yields and fruit prices generally, would service a debt of $700 and contribute $131 per acre or a total of $1572 from the grove, towards living expenses. Thus a purchase price of $1000 per acre, paying 30 percent cash, might be justified at this rate of net returns.

For a grove to pay high net returns it must yield well, and the fruit must be sold at a good price. These two favorable factors rarely occur at the same time, but such has been the case during six of the past eight seasons. Therefore, it is not expected that both factors will continue so favorable for as much as half the seasons of the future.

Several things might be pointed out that anyone who contemplates buying a citrus grove should consider before purchasing.

1. Learn something—as much as possible—about citrus production and marketing before buying a grove. It might pay well to spend a year or more in the employ of a good caretaker or grower, or several months each in the employ of several different such men.

2. Upon locating a grove that you contemplate purchasing, obtain an accurate tree count by variety, age of tree, and tree condition.

3. Obtain the yield, gross returns, production costs, and net returns each season for the past ten or twelve seasons. By so doing four to six unusually good seasons would be had together with six or eight seasons which were not so favorable. Study and analyze these records season by season contrasting the averages for the favorable and unfavorable seasons.

4. Correlate the yield with age of trees over the entire period of these records and contemplate increases in yield and grove value if the grove is young in age.

5. Check for unusual soil conditions, dryness of soil, and grove location with reference to likelihood of cold damage to the entire acreage and/or cold spots in the grove.

6. Obtain irrigation history of grove and if it is decided irrigation facilities are desirable, check availability of labor and equipment for such, together with the water supply. The cost of irrigation equipment, the cost of the application of water, and the availability of the labor necessary during critically dry peirods should not be overlooked.

7. Check with the fruitmen who have been handling fruit from this grove, as to its quality and saleableness.

8. Selling fruit at a price advantageous to the grower is fully as imporotant as efficient production at a low cost. Therefore, it is highly important that a good job of selling the fruit be done as well as a good job of production. Much time and effort should be spent in studying the various outlets and channels of citrus marketing in order to obtain the maximum price for fruit.

9. If it is contemplated that a caretaker will be employed to do the grove work, check availability, reliability, and desirability of such in the vicinity. Also check the rebate history of cooperative caretakers in comparing rates of caretaker charges.

10. Do not buy a grove at an inflated price. But if you must buy a grove, remember that the best groves usually come nearer being worth inflated prices than the poor groves are. In other words, you will have a better chance of making the best groves pay out than you will poor groves, at present prices. Also bear in mind that it is harder to pay debts if and when prices in general are falling.

11. In buying grove property get sufficient acreage to supply ample income to carry the debt load, if any, and to furnish a good living for self and family. With a reasonable purchase price, it is better to have a small equity in a good grove of ample acreage —20 acres or more—than to have a larger equity in fewer acres.

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Is this the time to buy additional citrus acreage?

Some growers who have been producing citrus for many seasons contemplate purchasing additional acreages. Much of the material of this publication up to this point will apply to such growers. Adequate volume or acreage is always an important consideration and should not be overlooked.

Profits from grove ownership arise from profitable production of citrus fruit, and from rising grove values if the grove is sold at the higher price. With lagging costs and favorable weather conditions, profit from citrus production and from grove ownership have been unusually good during the recent inflationary period. However, such periods of inflation come to an end, and weather conditions do not continue so favorable indefinitely. Groves held past the inflationary period are often a source of serious loss to the owner, because of continued high costs of ownership, reduced profits from fruit production, and declining grove values. If fruit prices remain low and costs continue to be high, profits from fruit growing will decline.

There have been instances in recent years in which growers have bought additional groves and paid for them with the returns of a few fruit crops, while the groves increased in value. Both the general price situation and good yields have been favorable for such success. Growers now in a favorable credit position need to beware lest their enthusiasm for recent successes lead them to set their own stage for disastrous expericnces later.

Groves that can be bought and paid for quickly under favorable circumstances sometimes can be lost just as quickly under unfavorable conditions. With increasing costs in relation to prices received, one or two years of low yields because of unfavorable weather or any other reason, would make it increasingly difficult for growers to make payments on a mortgage. In some instances, groves already free of debt are offered as partial security for the loan required to buy additional grove property. Accumlated savings are used to make the down payment. The expectation is that a few favorable seasons will put the grower in a safe position to carry the increased investment. If the unfavorable seasons come first, the expectation may not be realized. It is always harder to pay debts if and when prices in general are falling.

In growing citrus, a productive grove in the hands of a capable grower is nearly always a good investment, but low-producing groves are seldom good investments in the long run. Average-producing groves become bad investments in an economic depression. Low yields for any reason may create a depression for the individual grower. If a good grove is free of debt, a capable owner-operator may forego an interest income and successfully carry the investment through a depression.

Some people believe that an economic depression is impossible or at least unlikely because of government efforts to support farm income and safeguard the economy generally. They may be right, but pressure from rising production costs, increasing taxes, and slackened demand for citrus products could place a severe strain on the safeguards, requiring an ever increasing proportion of the taxpayer's declining income for support. If unfavorable weather hazards should occur in combination with economic hazards, the individual grower with his savings in a form more liquid than groves would be in a much better financial position than the man with a lot of groves and a big debt. An investment in better production methods might be safer and more profitable than an investment in additional groves, particularly if money is borrowed to buy the groves.

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A Method For Estimating Soluble Solids In Dried Citrus Pulp

OWEN W. BISSETT
U. S. CITRUS PRODUCTS STATION[1],
WINTER HAVEN, FLORIDA,
AT 1950 MEETING FLORIDA STATE
HORTICULTURAL SOCIETY

Introduction

Inquiries and requests on the part of processors of dried citrus pulps and citrus molasses indicate a need for a method whereby the soluble solids present in commercial, dried citrus pulps might be estimated.

Processors are adding molasses at varying rates to pressed pulps prior to drying. Few, if any, operators use proportioning equipment to control qualities of the products as related to the molasses content. The problem facing the industry is therefore twofold: (1) Development of a method for evaluating the molasses, or soluble solids, content of the finished products; and (2) studying the hygroscopic characteristics as related to storage life of dried citrus pulps containing varying amounts of citrus molasses. This latter problem will be the subject of a later report.

The method for estimating the soluble solids content of dried citrus pulps should be simple and reasonably accurate, such that it would have practical application in the processing plants, for the purpose of differentiating sweetened and unsweetened feeds as well as establishing the relative molasses content in terms of soluble solids. Official methods of analysis (2) are tedious and time-consuming, and require use of equipment not generally available in citrus pulp plants. Processors feel that such methods attain a degree of accuracy not warranted and are so expensive and time-consuming as to be economically impracticable.

A simple and rapid method has been developed which is satisfactory for estimating the soluble solids. It consists primarily of dissolving the soluble solids in dried pulp samples by suspension in water, the liquid phase being removed by filtration and the Brix value of the solution determined. Experimental results presented in this paper indicate that this method should prove valuable to the industry in evaluating the soluble solids content of dried citrus pulps.

1. One of the laboratories of the Bureau of Agriculture and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

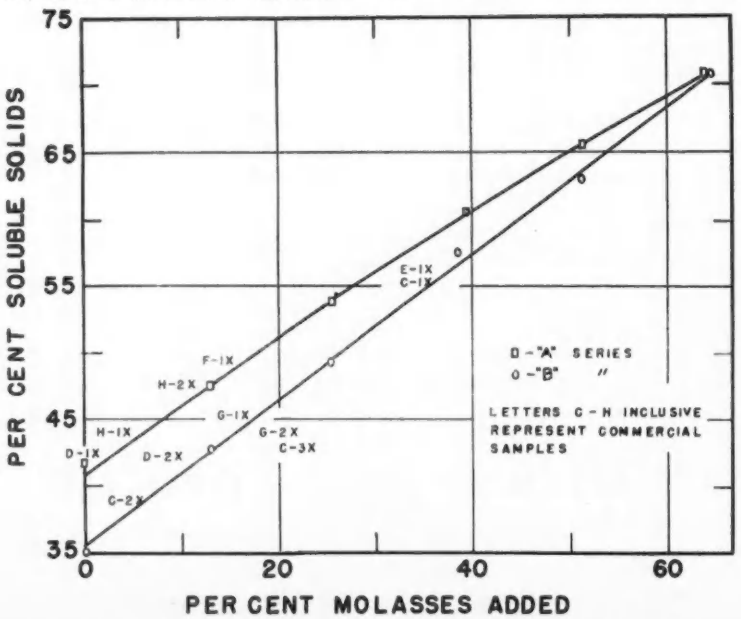

Figure 1. Soluble Solids Found In The Samples Are Plotted Against The "Molasses Added" As Defined In The Report. "A" Series (Grapefruit Pulp);—"B" Series (Mixed Orange and Grapefruit Pulps).

Preparation of Authentic Samples

Two series of samples ('A" and "B") were prepared to contain pulp and molasses solids as follows: (1) All pulp solids (no molasses added), (2) 90% solids and 10% molasses solids, (3) 80% pulp solids and 20% molasses solids, (4) 70% pulp solids and 30% molasses solids, (5) 60% pulp solids and 40% molasses solids, and (6) 50% pulp solids and 50% molasses solids.

The "A" series was prepared from grapefruit pulps at 28.45% solids and molasses at 73.7%solids; while the "B" series represents mixed grapefruit and orange pulps of 25.9% solids and molasses at 72.0% solids.

The materials used in preparing the above two sets of samples were obtained from commercial plants; the pulps being taken immediately following the presses. The pressed pulps were held in frozen storage and the molasses under refrigeration while being used as source materials in preparing the experimental samples.

The pulp and molesses required for a given sample were weighed together in the bowl of a dough-type mixer[2] and mixed for a minimum of 15 minutes. The materials were allowed a contact period of one hour before being placed in a circulating air oven adjusted

2. Any other type of equipment having the same capabilities would serve the purpose.

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to 80°C. Samples were removed when judged to contain not over 8% moisture.

Dried citrus pulps are composed of both large and small particles of the various components. In order to minimize errors due to sampling, 400-gram samples were ground in a hammer mill[2] to pass a 1/16-inch mesh screen. After thorough mixing, small subsamples of such preparations yield reproducible analytical values. Consequently, both the laboratory preparations of pulp and the commercial pulps used in this study were prepared for analysis in this manner.

Method of Analysis

The soluble solids in a sample of citrus pulp were dissolved in water and the Brix value of the liquid determined. By simple calculation the soluble solids content of the sample was established.

To a 25-gram portion of the prepared sample 200 grams of hot water (about 70°C.) were added followed by continual moderate stirring on a hot plate, adjusted to maintain 70° to 80°C. for 20 minutes. The sample was then cooled in a water bath to room temperature and water added based on the tare weight as required to replace that lost through evaporation during the heating period. The sample was again stirred for 2 minutes before filtering through a dry "filter aid" pad in a Buchner funnel using vacuum.

Total soluble solids of the filtrate were determined by both refractimeter and hydrometer. Iranzo and Veldhuis (1) have reported close agreement of both refractometer and Brix values with that of total solids in citrus molasses. Therefore, the Brix volues of the filtrates obtained in this study represent a soluble solids concentration of one-ninth that of the original sample. The percent soluble solids was then obtained by multiplying Brix values by the factor of 9.

Vacuum oven moisture vlaues were determined on all samples and all analyses were based on a calculated moisture-free basis. Vacuum oven equipment is not generally available in commercial citrus pulp plants but practically all of them use the Dietert Moisture Teller.[3] It was felt that conditions for operation of the Dietert which would give results in reasonable agreement with values obtained by the vacuum oven method would be of some value. It was found that 15 minutes' treatment at 230°F. of a 25-gram sample of ground pulp prepared as previously outlined would give satisfactory values. It should be noted that variation in particle size of sample materials would induce variable results with the "Dietert" unit and therefore the conditions here recommended should be closely followed.

Discussion

In establishing the sample size and ratio of sample to water, it was found that the pulp would absorb 4 to 5 times its weight of water, thus making it necessary to use a ratio greater than 5 to 1. The use of a 25-gram sample and an 8 to 1 ratio of water to sample yields 70 ml. or more of filtrate, depending on the ratio of soluble and insoluble solids present. At least 70 ml. of solution is necessary to float a standard Brix hydrometer (graduated 0° to 10° in 0.1° units) when used with a 100-ml. graduate which has been found suitable. The use of a ratio greater than 8 to 1 would have no advantage but would only further decrease an already low concentration of soluble solids in the solution.

The averaged total soluble solids by both hydrometer and refractometer for all samples used in this

(Continued on page 16)

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Reports Of Our Field Men . . .

SOUTHWEST FLORIDA
Eaves Allison

"Like Baa, Baa, Black Sheep's wool," there has been sufficient bloom this spring to take care of everybody, including the little boy who lives down the lane. With a few spring showers to help out the growers' irrigation plants there should be enough fruit set on all varieties to take care of the packing houses,the canners, the freezer, the fruit stands, and insects and the hurricanes. With the size of the prospective crop in mind it would be well for all growers to be prepared to follow up their spring topdresser with a heavy application of a good well balanced fertilizer this summer, with plenty of secondaries and plenty of poundage. Spring vegetable crops are coming along slowly with a slight set-back from the middle of March cool snap. Glads are being laid by, and spring pasture programs are taking definite shape, with applications of fertilizer and soil conditioner on the improved areas.

PASCO COUNTY
G. C. (George) James

Although we have not suffered from lack of moisture in this area for several months, many growers started irrigating their groves to insure the setting of the excellent bloom that appeared the latter part of February. However, rains preceding the cool spell early in March halted these operations. The spring growth is beginning to harden up now and the trees in general are in fine shape. With mid-season fruit nearly harvested, Valencias are being moved at a fairly rapid rate. The growers still believe that the estimate of the Valencia crop is too high.

POLK COUNTY
J. M. (Jim) Sample

We were getting dry in this section and everyone that could irrigate had their plants in full operation until March 12th when we had a good rain in most all areas, and then the following week we had some more showers. We have had an excellent bloom and these rains certainly were beneficial in helping the set of a good crop. The spring application of fertilizer has been applied, trees are looking good and plenty of new growth is now in appearance. Spray machines have been busy getting all insects and diseases under control in order that the coming crop will be one of the best ever produced. Fruit has been moving at a very good rate and as we move over the territory at this time it is plainly evident that the big volume of mid-season fruit has been moved. Some Valencias are moving at this time and there is much evidence of fruit buyers who are interested in the Valencia crop.

WEST CENTRAL FLORIDA
E. A. (Mac) McCartney

We have had a very heavy bloom on all varieties of citrus trees, both inside and outside and with trees in very good condition should have a bumper crop of fruit this coming season. We had a heavy rain on March 11th and 12th that has been very beneficial to all groves in this section and will be of much help in getting the young fruit started off in excellent condition. This rain came at the proper time as most growers had just completed their spring application of fertilizer. All varieties of fruit that we have on the trees are being moved to market and there is a great deal of activity by buyers in trying to get what fruit remains to be picked. The summer application of fertilizer will start in April. Some spots of the vegetable section were hurt on account of too much rain but on the whole growers were benefitted.

NORTH CENTRAL FLORIDA
V. E. (Val) Bourland)

The recent rains were beneficial to grove property and we are glad to report that practically all groves are looking in excellent condition after a very good bloom that is now setting and the new growth has been abundant. In other words, this new season is getting off to a very good start. Fruit is moving fast and prices are good, but growers are hoping that it will get better as the Valencia movement gets in high gear. Banks have been moved from young trees and they have been worked and fertilized to put them in excellent condition. The cucumber and melon growers were worried about the cold spell of mid-March but they came through in very good shape, with very little damage except for the wind which was very strong for melons. The cattle people are beginning to smile with the coming of warmer weather.

HILLSBOROUGH AND PINELLAS COUNTIES
T. D. (Tillman) Watson

The rains that we had during the middle of March were spotty in this section. Some areas experienced downpours while in other localities we received little moisture. However, it was very beneficial to the trees as they were just beginning to set the new fruit crop, and it now appears that the new crop will be ample. The movement of mid-season fruit is just about over and Valencias are beginning to move in volume. Prices have been good but there are a large number of growers dissatisfied with the present price structure and are planning to hold their crops until later in the season at which time they believe that they will be able to get more money. Considerable spraying has been done and will be continued. Everything that can be done to produce good fruit is being done. The spring application of fertilizer is working and new growth is plentiful with practically all groves in excellent condition. The summer application of fertilizer will get under way in April and we are going to have good quality fruit for the market next season. The watermelon acreage has been increased this spring and the rains have been very helpful to their growth.

SOUTH POLK, HIGHLANDS AND HARDEE COUNTIES

This territory has had a very bad spring season for the past few years, but it looks as if we are being smiled on this spring. We have moved a large tonnage of fruit, we have an excellent bloom that is now setting and we are not suffering from too much dry weather. If similar conditions continue we are going to have a good crop of fruit that will be of excellent quality because growers are determined to do the necessary fertilizing and spraying to make top quality fruit. Valencia oranges are beginning to move in volume and at fairly good prices. It is believed that this price might be better as the season goes along.

ADVERTISEMENT — LYONS FERTILIZER COMPANY

Seemed like everybody was sort a worried during the winter about what might happen to the fruit in this state on account of so much cold weather. But we got out of it with mighty little real damage and these cold spells probably did us a lota good by keepin' our trees in a dormant condition. Leastwise, it seems that the rest given the trees made 'em put on the doggonest bloom we've seen in years. Then the rain in the middle of March was plumb helpful in setttin' the bloom. They's a lot of growers who think that a heavy bloom don't set a big crop but our guess is that with the trees in such good shape that if the growers will give 'em the help they need we'll have a mighty good crop of quality fruit.

The average fertilizer man in Florida is a lot more than just a salesman. Most of 'em are constantly checking one grove against another when they have been treated in different ways. They visit the Citrus Experiment Station, attend various scientific meetings and conduct experiments themselves, so we suggest that it is a good plan for growers to consult with some fertilizer man as to the best procedure to be used in developing the best crop of fruit now on his trees so that it will be in tip-top shape for marketin' this fall.

'Sumpin' over 20 years ago when we was fresh outa college and had just come to Florida to work in the fertilizer business there was a lota citrus folks who felt that there was an overproduction of citrus fruits. Production has increased many times since then, but the development of new and larger markets and new uses for citrus still enables us to sell our fruit and if we'll keep on with our research program and devote our time to growin' the best fruit possible it's our opinion that there'll always be a market for our fine fruit.

The goin' was kind of tough for the vegetable growers during the winter season but the outlook for a fine spring season is bright, and with proper marketin' the growers should reap a nice profit.

The Florida cattlemen had a rough time of it this past winter but the rains and the sunshine is bringin' out the pastures in nice shape and the picture looks a lot brighter now and cattle should be in peak condition for market this fall.

Uncle Bill

A METHOD FOR ESTIMATING SOLUBLE SOLIDS IN DRIED CITRUS PULP

(Continued from page 13)

study are given in Table I. The average deviation between duplicates of hydrometer values in the "A' and "B" series samples was 0.062° Brix or about 1 percent, while that of the refractometer values was 0.17° Brix or about 3 percent. Total soluble solids obtained by the refractometer were usually higher than those of the hydrometer, the average difference being about 0.1° Brix. In this table the percent molasses added values were computed in the terms used by the industry, i.e., pounds of molasses added per hundred pounds of product obtained. Computations here are based on 72° Brix molasses and a dried product at 8° moisture. Total sugars, also given in Table I, were determined on all samples used in this study by the official Munson-Walker gravimetric method (2). A correlation can be established between Brix values and total sugar values, but it is not sufficiently clear cut to merit further elaboration here.

In Table II the calculated total soluble solids (that present in the pressed pulp plus that added in molasses form) may be compared with values obtained by the method (° Brix x 9), as found in the "A" and "B" experimental samples. The soluble solids found in the respective nonmolasses added samples formed the basis for computing the total soluble solids values. Agreement in the "A" series is considered good while the cause of the variance observed in the "B" series is not immediately apparent. The data indicate that, when applied to properly prepared dried citrus pulp samples, the method will give representative soluble solids values.

The relationship of percent soluble solids to percent molasses added for the "A" and "B" series samples is represented graphically in Figure I. Here again the term "percent molasses added" is used to indicate the pounds of molasses used per hundred pounds of dried feed produced. The data for the samples were calculated to 8 percent moisture basis before plotting in Figure I. The 8 percent moisture level was chosen because that is the value which has been given by the feed producers as optimum.

The two curves are quite similar and indicate a regular, progressive increase in soluble solids content with increasing molasses. However, it should be remembered that the "A" samples represent a grapefruit pulp and the "B" samples represent mixed orange and grapefruit pulps. The soluble solids values of the two unsweetened experimental samples are quite different and this difference is reflected throughout the two graphs. Other samples might show even wider deviations. It is suggested, therefore, that each processor prepare his own set of reference curves rather than use those presented in this paper. Thus, by knowing the nature of the pulp being processed the operator might judge how much molasses to add in order to produce a dried product of the desired soluble solids content or vice versa.

The commercial samples have also been plotted on Figure I and it will be noted that the values do not fall in a narrow band; however, the general trend follows that of the experimental samples. Inasmuch as the varieties of pulps, their moisture, and the exact amount of molasses added is not known for these samples, further observations are not warranted.

The samples represent different types of dryer operation. Samples C, D, E, and H were produced in fire dryers; F in a steam tube dryer and G in a 2-stage fire and steam-tube dryer, thus representing a cross section of commercial operation. It is quite possible that the method of drying, as well as the inherent differences in the raw product, might influence the soluble solids characteristics of the product—another reason why each processor might wish to prepare his own set of reference curves.

In most plants the molasses is added with manual control and is not strictly proportioned. The molasses content is really indicated by the amount of molasses used and the quantity of feed produced during a shift or similar period. This may account for some of the variation in the commercial samples. Strict proportioning should result in greater uniformity of the product.

If all the molasses produced in a plant handling citrus pulp were

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3. The mention of certain trade products does not imply that they are endorsed by the Department of Agriculture over similar products not mentioned.

Table I
Average Total Soluble Solids and Total Sugar Values of Filtrates

Sample	Molasses Added	Total Soluble Solids: Hydrometer	Total Soluble Solids: Refractometer	Total Sugars
	%	° Brix	° Brix	%
A-31	0	4.63	4.70	3.29
A-32	12.9	5.27	5.30	3.68
A-33	25.8	5.97	6.09	4.28
A-34	39.4	6.72	7.06	4.41
A-35	51.5	7.25	7.39	4.60
A-36	64.2	7.87	8.09	4.89
B-37	0	3.90	3.77	1.73
B-38	13.0	4.77	4.80	2.56
B-39	25.7	5.49	5.68	3.47
B-40	38.7	6.40	6.38	4.24
B-41	51.3	7.00	7.07	4.45
B-42	64.4	8.10	8.14	5.39
C-1	35.8	6.16	6.34	3.84
C-2	5.0	4.42	4.45	2.19
C-3	20-25	4.82	4.96	2.58
D-1	0	4.68	4.86	2.35
D-2	8.0	4.72	4.79	2.69
E-1	35.8	6.22	6.48	3.87
F-1	15.0	5.47	5.65	3.41
G-1	16.0	5.05	5.22	3.47
G-2	20.0	4.90	5.00	3.52
H-1	3.0	4.92	5.00	3.19
H-2	10.0	5.30	5.36	3.68

Table II
Comparison of the Calculated Per Cent Soluble Solids Present With Values Indicated by the Method for Series "A" and "B" Samples

Sample	Soluble Solids, Calculated %	Soluble Solids, Found %
A-31		41.7
A-32	47.5	47.4
A-33	53.3	53.7
A-34	59.1	60.4
A-35	64.9	65.2
A-36	70.8	70.7
B-37		35.1
B-38	41.6	42.8
B-39	48.1	49.4
B-40	54.6	57.6
B-41	61.1	63.0
B-42	67.5	72.8

Orange Concentrate vs. Frozen Lemonade Mix

Califronia poses a serious threat to the summertime sale of Florida frozen concentrates, according to Dawson Newton, advertising manager, Florida Citrus Commission.

Newton, who has just returned from an extensive trip through the North and the West, said the danger lies not in California's production of frozen concentrated orange juice but rather in their booming lemonade industry. This product is a new frozen lemonade mix.

The lemonade mix was second in sales to orange concentrate last summer and it has done much to improve the California lemon industry.

"I predict they will try to slow the sale of our orange concentrate during the summer with lemonade which would aid, to a great extent, the sale of their summer oranges.

"California oranges do not make the same quality concentrate as does Florida's," Newton said, "and the industry, although intensely interested in the orange concentrate, is currently processing lemonade mix as a means of keeping pace with Florida."

Newton said that cost factors, information he secured from a California source, will at present prevent California from entering the citrus concentrate market to the extent Florida has. He cited cost figures to show that the cost of growing a 77 pound box of oranges in California was $1.30 while a 90 pound box could be produced in Florida for about 60 cents.

He also showed that the consumer cost, for these charges between the tree and the retailer but exclusive of cost of supplies, for a case of concentrate was $10.52 for the California product against $5.91 for Florida.

These and other cost factors are prohibitive to California becoming a serious competitor in the frozen citrus juice field, Newton declared, "except as I have already pointed out—their lemonade product."

Newton said he was accompanied on his trip by Frank Roper, Winter Garden member of the Florida Citrus Commission and a member of the advertising committee.

"Mr. Roper and I served on a panel discussion with California concentrate interests and I think we created a lot of good will when Mr. Roper told the group that only 40 percent of our crop is suitable for concentrating purposes, that is, this amount of the crop will meet the high standards set up for concentrate.

"A good many of those attending this national frozen food convention in San Francisco thought that our entire crop could be utilized for concentrate."

Newton said some of the interesting points brought out by leaders in the frozen food field included the prediction that frozen food prices would go up in the next few months and the statistic that about six and a half per cent of all food consumed by the public comes out of a deepfreeze.

"I also enjoyed a frozen food breakfast," Newton said, "and it seems this type meal will soon be generally available.

"It included frozen orange juice, frozen waffles and frozen coffee. The waffles are put right into the toaster and when they pop out they are done."

Newton said the development of frozen citrus concentrates in Florida has started a chain reaction that is ending in the creation of a mammoth frozen food industry with constant research to determine what foods are adaptable to freezing.

"In addition to the breakfast mentioned I also had frozen Chinese egg rolls and I learned that frozen concentrated apple juice and milk seem destined to be a regular food feature soon.

"So the frozen food business is really just starting and it was all brought about by Florida's development of concentrated citrus juice," he said.

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added back, it is estimated that the dried product would contain about 36% molasses. Thus, the data presented cover the ranges that would be expected in normal factory operation.

It is felt that the simple method described here will prove of practical value to processors of citrus pulp containing molasses. The method may be used in control of plant operations to establish the approximate molasses content.

A simple and rapid method has been developed for the estimation of the soluble solids content of dried citrus pulps. It is based on the use of a small portion of a large sample which is finely ground and thoroughly mixed. It is suitable for routine operation in establishing the range of molasses content of citrus pulps. In experimental samples, increasing additions of molasses resulted in the regular increase in the soluble solids values. The conditions for operation of the "Dietret Moisture Teller" which will approximate moisture values obtained by the vacuum oven method are also given.

References

1. Iranzo, J. R. and Velwhuis, M. K. Proceedings of the Florida State Hort. Society, Page 205, 1948.

2. Methods of Analysis. Association of Official Agricultural Chemists. 6th Edition, 1945.

In 1921 . . . Jack Dempsey was World's Heavyweight Champion . . . and President Harding signed a peace treaty with Germany and Austria, officially ending World War I.

In 1921 . . . the Peninsular Telephone Company was 20 years old and had a total of 17,500 telephones in operation.

Today . . . on its Golden Anniversary, the Company serves more than 153,000 telephones in more than 100 communities on Florida's West Coast.

PENINSULAR TELEPHONE COMPANY

Believes Concentrates Will Change Picture

In the following letter Mr. W. H. Mouser, general manager of Florida Fruit Growers, Inc., and long a leader in affairs of the citrus industry in Florida, takes issue with the conclusions of Mr. Zach Savage as expressed in his article "Should I Buy a Citrus Grove" the first section of which appeared in the March issue of this magazine.

Citrus Industry
Bartow, Florida
Gentlemen:

Referring to Mr. Zach Savage's article entitled "Should I Buy a Citrus Grove" in your March issue.

I do not believe it is possible to figure the value of a grove based on average income during the past eighteen seasons. The development of the Concentrate deal as well as the increased use of juices, but especially considering the Concentrate, has changed the picture. The low price seasons experienced in the past should not happen in the future so long as the processors are able to use the heavy percentage of the production that they have used during the last two seasons.

In the marketing of fresh citrus, our surplus consists of the low grades and the off or undesirable sizes. This class of fruit lowers the market on **all** grades and sizes because of excess supply. Consequently with the processors using this surplus at prices which show the Growers reasonable profits, comparatively good prices should prevail on the citrus fruit shipped fresh.

Before the development of the Concentrate outlet, the Growers, in considering the value of their groves, figured that on a five year or seven year period they might experience a season of high prices, several seasons of reasonably good and profitable prices and perhaps one or two red-ink or cost seasons. It is my opinion that the development of the Concentrate deal and the reasonable belief that the production and sale of Concentrate will increase, should mean that the season of red-ink or cost returns should be a thing of the past, thus building up average returns over future years.

The above remarks explain why we do not believe that the fair value of groves at this time can be based on average net results realized by Growers over the past eighteen years.

With kind regards, we are,
Sincerely yours,
Florida Fruit Growers, Inc.,
W. H. Mouser,
General Mgr.

DEERFIELD GROVES GETS TOP AWARD

At the recent Florida Citrus Exposition at Winter Haven, top award for Marsh Seedless Grapefruit went to Deerfield Groves Company of which Mr. A. B. Michael is president. The box winning the top award was auctioned off for $500, the proceeds going to charity.

INCREASED PRODUCTION OF CONCENTRATES ANTICIPATED

Florida concentrators who last season produced 22,000,000 gallons of frozen orange concentrate are expected to increase production to 25,000,000 gallons this season. Up to the middle of March, concentrators and other processors had used 60 percent of the oranges and 55 percent of the grapefruit picked. From a percentage standpoint, that is slightly less than last year, but from a volume standpoint it is slightly more.

CITRUS INSECTS FOR APRIL 1951 . . .

(Continued from page 4)

Station at Lake Alfred or at Fort Pierce.

FORMULA 2.

Copper sulfate	3 lbs.
plus lime	1.2 lbs.
or neutral compounds.	
Wettable Sulfur	5 to 10 lbs.
Supplements (add any or all as needed):	
DN Dry Mix	2/3 lbs.
or DN 111	1¼ lbs.
only if temperature stays below 88°F.	
or Neotran	1 1/2 to 2 lbs.
Parathion	1 to 2 lbs.
Zinc sulfate	3 lbs.
plus lime	1 lb.
or neutral compounds.	
Manganese sulfate	3 lbs.
plus lime	0.1 lb.
or equivalent in other forms.	
Borax	1 lb.
plus lime	¼ lb.
Lead arsenate (on grapefruit only)	½ to 1¼ lbs.

FORMULA 3.

Oil	1.3%
Neutral copper compounds at 3/4 lb. metallic copper.	
Supplement:	
Lead arsenate (on grapefruit only)	½ to 1¼ lbs.

For details see the complete spray schedule.

FLORIDA CITRUS COMMISSION PROMOTING VALENCIA SALES

Ralph M. Henry, director of the merchandising division of the Florida Citrus Commission has returned from a week's tour of markets in New York, Baltimore, Philadelphia and Washington in preparation for the coming valencia orange season.

Henry, manager of a staff of 30 specially trained field men, worked with the Commission's representatives in those market areas to pave the way for Florida's last orange deal, now just beginning.

An estimated 23 million boxes of oranges, all but a few being valencias, remain in the state and will be marketed during the next fifteen-week period. The valencia deal will be kicked off by advertising in 158 leading newspapers East of the Mississippi, part of the Commission's regular advertising program.

In addition, a fresh orange promotion is scheduled for April 12 to 21, part of the work being done by the National Citrus Merchandising Committee, of which Dawson Newton, Commission advertising manager, is chairman.

Henry said in anticipation of this national promotion he is going to call on various factors of the trade, with the field men, to urge full cooperation during this period.

This is the fourth promotion, on the national level, of the season. These promotions are participated in by all citrus producing areas. A cooperative effort that results in combining the national advertising of all areas and supplementing this mass effort with special promotional material and extensive field merchandising. The end result is a greatly increased movement of citrus through retail outlets.

Classified Ads

$600.00 BUILDS COZY 4 ROOMS and bath. Concrete block. Stuccoed. Complete instructions $1.00. Saginaw Realty Agency, Box 992, Saginaw, Mich.

DRAFTING, MECHANICAL, ARCHITECTURAL, STRUCTURAL; — Small or Large Jobs; House Plans to Industrial Plants. Lakeland Engineering Associates, Inc., 211 East Lemon Street, Lakeland, Florida.

Many of Florida's
Largest Industrial Concerns
Have Us Do Their Printing . . . .

Special Ruled Forms
Catalogues
Office Forms and Stationery
In fact anything that's printed
Can be done properly
and economically in our plant

Write us for details and quotations

Bartow Printing Company
550 North Broadway
P. O. Box 120
Bartow, Florida

You, Too, Are Invited

To join that large and successful group of Florida Growers who have found that the slogan shown above is something more than a catchy advertising phrase . . . . the fact that you can produce Maximum Crops of Finest Quality with Lyons Fertilizers, is a simple statement based upon many years of practical demonstration . . . . Many of Florida's most successful citrus growers have profited year after year through the use of Lyons Fertilizers.

You, too, can profit by using Lyons Fertilizers

Lyons Fertilizer Company

Tampa, Florida

AGENTS CARRYING STOCK:

Arnold Feed & Seed Store, Winter Garden
John W. Barber, Jr., Webster
Berryhill Hardware Company
22 Street Causeway Blvd., Tampa, Fla.
Walker's Grocery Co., Wauchula, Fla.
Farmers Supply Co., Immokalee
Norman Blocker, Blanton
Butler Feed Co., 409 13th St., Leesburg
H. C. Beckett Grove Service, Winter Garden
Dowling Feed Store, 715 9th St., Bradenton
Fox Feed Store, 413 W. Waters Ave., Tampa
W. B. Goding & Son, Apopka
Farmers Supply Co., Immokalee
Harry Goldberg, Pompano
Raymond Graham, Zolfo Springs
Hillsboro Feed & Milling Co., 3021 E. Broadway, Tampa
Harold H. Kastner & Co., 1300 French Ave., Sanford
A. G. Macaulay, 1039 Central Ave., St. Petersburg
McCord Feed Store, Winter Garden
Judson Nichols, Pierson
Robert A. Nordman, 232½ N. Clara Ave., Deland
John W. Parker, Arcadia
Ruskin Farm Supplies, Ruskin
Sarasota Feed Co., 9th and Lemon, Sarasota
A. H. Schrader, San Antonio
Slaughter & Taylor, Inc., 8th Ave., Palmetto
South Bay Growers, Inc., South Bay
J. C. Smith & Son, Lakeland
Smith Feed Store 110 N. Rodgewood, Sebring
Sparks & Jordan, 5511 Nebraska Ave., Tampa
Taylor's Feed Store, Zephyrhills
Tampa Feed Co., 5904 Florida Ave.
Tarpon Feed & Supply Co., Tarpon Springs
Thornton Feed Co., 8718 Nebraska Ave., Tampa
Tuckett, Inc., Minneola
Unity Farms, Inc., Pahokee
G. E. Wetherington, Route No. 2, Box 479, Plant City
Wells Citrus Service & Supply Co., Tavares

FIELD REPRESENTATIVES:

J. H. Rickborn, Sales Manager, Lakeland
V. E. Bourland, Winter Garden
E. A. McCartney, Temple Terrace, Tampa
James M. Sample, Lake Hamilton
Eaves Allison, Sarasota
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LYONIZE YOUR CROPS

LYONIZE YOUR CROPS